PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-056343
(43)Date of publication of application : 05.03.1993

(51)Int.Cl. H04N 5/243
// G03B 7/28

(21)Application number : 03-211040
(22)Date of filing : 22.08.1991

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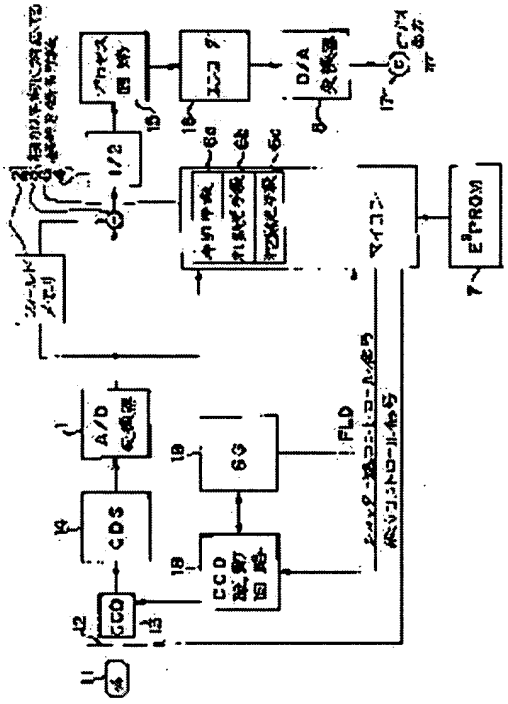
(54) ELECTRONIC IMAGE PICKUP DEVICE

(57)Abstract:
PURPOSE: To prevent the generation of a white skip or a black flat by respectively inputting an objective luminance signal of each area from a CCD which is divided into plural areas to a microcomputer, and discriminating a luminance difference at each area by a discriminating means.
CONSTITUTION: When photometric information of each area from a CCD 13 whose photoelectric conversion face is divided into plural areas is fetched through a CDS 14 and an A/D converter 1 by a microcomputer 6, the level difference of the photoelectric output of the central part and surrounding part of each area of the CCD 13 is discriminated by a discriminating means 6a in the microcomputer 6. Then, when the level difference is discriminated to be beyond a prescribed value by the discriminating means 6a, the microcomputer 6 judges that an object is in a counter light state, repeatedly executes a selective central photometry and a peak photometry at each field, and searches a signal corresponding to the additive average of each photometric value. Thus, the storage time of a charge which is stored on the photodiode of the CCD 13 is changed at each field, so that an exposing time can be shortened for a high luminance signal.



LEGAL STATUS

[Date of request for examination] 21.08.1998

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3273619

[Date of registration] 01.02.2002

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

(19)日本国特許庁（ＪＰ）　(12)**公開特許公報**（Ａ）　(11)特許出願公開番号

特開平5－56343

(43)公開日　平成５年(1993)３月５日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｈ０４Ｎ　5/243		9187－5C		
// Ｇ０３Ｂ　7/28		7316－2K		

審査請求　未請求　請求項の数１(全　7　頁)

(21)出願番号　特願平3－211040

(22)出願日　平成３年(1991)８月22日

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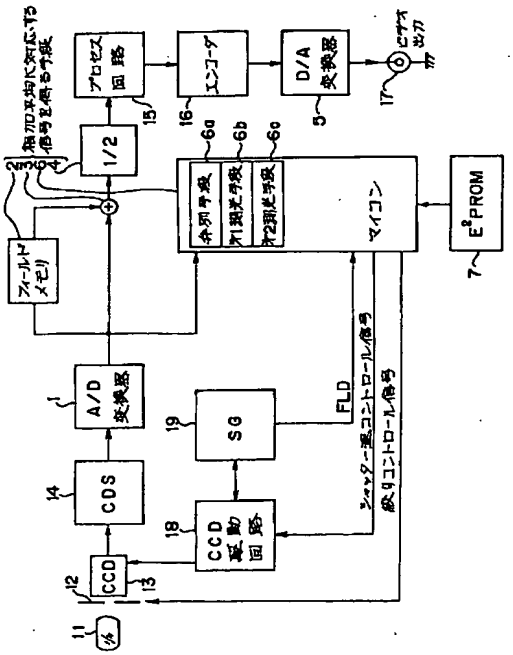
(54)【発明の名称】　電子的撮像装置

(57)【要約】
【目的】　被写体の輝度差が大きいシーンを撮影するときでも白とびや黒つぶれを生じないようにする。
【構成】　複数の領域に分割されたＣＣＤ１３からの各領域毎の被写体輝度信号を各別にマイコン６に入力し、弁別手段６ａで上記領域毎の輝度差を弁別する。これが所定値を上廻れば、中央重点測光とピーク測光とをフィールド毎に繰返し実行し、これら各測光値の相加平均に対応した信号を求める。



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【特許請求の範囲】
【請求項１】　光量に応じて当該撮像手段に係る露光量を制御する電子的撮像装置であって、
単位画像に対応する上記撮像手段の光電変換面内で、その部分間での光電変換出力のレベル差が所定値を超えているか否かを弁別する弁別手段と、
上記弁別手段が上記撮像手段の光電変換面内でその部分間での光電変換出力のレベル差が所定値を超えていることを弁別したときには、上記光電変換面全面乃至その特定部分からの光電変換出力に基づいて上記露光量の制御を行う第１の露光制御モードと、上記単位画像に対応する撮像手段の光電変換面からの光電変換出力のうちの実質的なピーク値に基づいて上記露光量の制御を行う第２の露光制御モードとの２つの露光制御モードを交互に実行し、該第１の露光制御モードによる光電変換出力に対応する信号と、第２の露光制御モードによる光電変換出力に対応する信号との相加平均に対応する信号を得る手段と、
を具備したことを特徴とする電子的撮像装置。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は、電子的撮像装置、詳しくはダイナミックレンジが広く、逆光シーン等をも適切に撮像可能な電子的撮像装置に関する。
【０００２】
【従来の技術】従来の電子的撮像装置のブロック構成の概略は、図３に示すように、撮影レンズ１１と、同レンズ１１を透過した被写体光の光量を調節する絞り機構１２と、被写体光を光電変換して映像信号を出力する撮像手段としてのＣＣＤ１３と、この映像信号を相関二重サンプリングするＣＤＳ１４と、同ＣＤＳ１４の出力を輝度信号Ｙと色信号Ｃに分離して信号処理するプロセス回路１５と、これらの信号を例えばＮＴＳＣ復合映像信号に変換するエンコーダ１６と、図示しない外部機器に向けビデオ信号を送出するビデオ出力端子１７と、上記ＣＤＳ１４の出力を積分して平均測光情報を出力する平均測光回路２０と、上記平均測光情報を基準電圧Ｖref と比較して上記絞り機構１２の絞りを制御する比較器２１と、上記ＣＣＤ１３の垂直転送パルス，水平転送パルス並びに不要電荷排出のための基板電圧印加を制御するＣＣＤ駆動回路１８と、テレビジョン規格に則ったタイミング信号を発生するＳＧ１９とから構成されている。
【０００３】このように構成された従来の電子的撮像装置における露光制御は、上記平均測光回路２０から出力された平均測光情報が、比較器２１の非反転入力端に印加された基準電圧Ｖref に等しくなるように絞り機構１２の絞りを制御し、これによって所定の露光量で撮影するようにしている。
【０００４】
【発明が解決しようとする課題】しかしながら、平均測光情報が予め設定された基準レベルになるように露光制御する上記従来の電子的撮像装置では、ＣＣＤ等の撮像手段のダイナミックレンジが狭いので、例えば逆光シーンのような被写体の輝度差が大きい場合に問題が生じる。

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【０００５】即ち、図４に示すような人物１０１を逆光下で撮影する場合、主要被写体である人物１０１が低輝度なのに対し、樹木や山等の背景１０２は高輝度になっている。そこで主要被写体である人物１０１に露出を合わせると、高輝度部である背景１０２は露光過多のため、その階調が失われてしまって一様に白っぽくなる、所謂白とびを起こしてしまい、見苦しい映像になってしまう。逆に高輝度部である背景１０２に露光を合わせると、実際に撮影したい主要被写体である肝心の人物１０１が露光不足のためにその階調が失われて一様に黒っぽくなる、所謂黒つぶれを起こしてしまう。
【０００６】そこで本発明の目的は、上記問題点を解消し、被写体の輝度差が大きいシーンの撮影においても、白とびや黒つぶれを生じることのない電子的撮像装置を提供するにある。
【０００７】
【課題を解決するための手段および作用】本発明の電子的撮像装置は、光量に応じて当該撮像手段に係る露光量を制御する電子的撮像装置であって、単位画像に対応する上記撮像手段の光電変換面内で、その部分間での光電変換出力のレベル差が所定値を超えているか否かを弁別する弁別手段と、上記弁別手段が上記撮像手段の光電変換面内でその部分間での光電変換出力のレベル差が所定値を超えていることを弁別したときには、上記光電変換面全面乃至その特定部分からの光電変換出力に基づいて上記露光量の制御を行う第１の露光制御モードと、上記単位画像に対応する撮像手段の光電変換面からの光電変換出力のうちの実質的なピーク値に基づいて上記露光量の制御を行う第２の露光制御モードとの２つの露光制御モードを交互に実行し、該第１の露光制御モードによる光電変換出力に対応する信号と、第２の露光制御モードによる光電変換出力に対応する信号との相加平均に対応する信号を得る手段と、を具備したことを特徴とする。
【０００８】
【実施例】以下、図面を参照して本発明を具体的に説明する。図１は本発明の一実施例を示す電子的撮像装置のブロック構成図で、前記従来例における図３と同じ構成部材には同じ符号を付してその説明を省略し、異なる部材についてのみ符号１～７を付して以下に説明する。
【０００９】符号１は、ＣＤＳ１４の出力をディジタル値に変換するＡ／Ｄ変換器、２は１フィールド分の画像情報をメモリするフィールドメモリ、３は上記Ａ／Ｄ変換器１の出力と上記フィールドメモリ２の出力とを加算する加算器、４は上記加算器３の出力に係数１／２を乗じる乗算器、５はエンコーダ１６から出力された例えば

ＮＴＳＣ方式のディジタル信号をアナログ信号に変換するＤ／Ａ変換器、６はマイコンで、内蔵された弁別手段６ａ，第１測光手段６ｂ，第２測光手段６ｃ等によりシャッタ速や絞りをコントロールする。また、７はＥ²ＰＲＯＭでＣＣＤ１３の飽和レベル等を書き込んでおき、その信号を上記マイコン６に供給するものである。

【００１０】上記マイコン６に内蔵された弁別手段６ａは、単位画像に対応する撮像手段としてのＣＣＤ１３の光電変換面内で、その部分間での光電変換出力のレベル差が所定値を超えているか否かを弁別するもので、例えば前記図４に示した逆光シーンでの撮影のように、被写体の輝度差が激しい場合にこれを弁別するものである。

【００１１】また上記マイコン６に内蔵された第１測光手段６ｂは、上記ＣＣＤ１３の光電変換面前面及至その特定部分からの光電変換出力に基づいて露光量を制御する第１の露光制御モード時に用いられる測光手段で、画面をいくつかの領域に分割し、中央部の重み付けを大きく、また逆に周辺部では重み付けを小さくしたので、前記図４に示した逆光シーンにおける中央に配置された主要被写体１０１に重点を置いて周辺部も加味した測光を行うことができ、以下中央重点露光と呼称する。　更に、第２測光手段６ｃは、単位画像に対応する撮像手段としてのＣＣＤ１３の光電変換面からの光電変換出力のうちの実質的なピーク値に基づいて露光量を制御する第２の露光制御モード時に用いられる測光手段で信号のピークレベルに対応しているので、前記図４に示した逆光シーンにおける高輝度の背景に露光を合わせた撮影に用いることができ、以下ピーク露光と呼称する。

【００１２】なお、本実施例における撮像手段としてのＣＣＤ１３は、その光電変換面が複数の領域に分割され、各領域毎の測光情報を各別に取り出せるようになっている。また、同ＣＣＤ基板に高電圧を印加すれば、その光電変換面上の不要な蓄積電荷を縦方向に排出できるようになっているものとする。

【００１３】このように構成された本実施例の動作の基本を先づ説明すると、上記第１の露光制御モードと第２の露光制御モードとをフィールド毎に交互に、例えば奇数フィールドでは上記第１の露光制御モードを、例えば偶数フィールドでは上記第２の露光制御モードをそれぞれ実行し、該第１の露光制御モードによる光電変換出力に対応する信号と第２の露光制御モードによる光電変換出力に対応する信号との相加平均に対応する信号を求めるものである。そして、このような相加平均に対応する信号は、上記フィールドメモリ２，加算器３，乗算器４並びにマイコン６で求められるもので、以下図２のタイミングチャートを並用しながら詳細に説明する。

【００１４】先づ図２における各信号を説明すると以下のとおりである。

【００１５】測光切り換え信号…上記マイコン６内の第１測光手段６ｂと第２測光手段６ｃとを切り換える信号。

【００１６】ＦＬＤ…フィールド切り換え信号。

【００１７】ＶＢＬＫ…垂直のブランキング信号。

【００１８】ＴＧ…ＣＣＤのフォトダイオードに蓄積された電荷を垂直転送レジスタに転送するタイミング信号（実際には、このタイミングで垂直転送パルスをハイレベルに駆動することで電荷の転送を行う）。

【００１９】ＨＤ…水平ドライブパルス。

【００２０】ＸＳＵＢ…ＣＣＤイメージャの基板に対して高電圧を印加し、縦方向に電荷を排出するタイミングを示す信号で、水平ドライブパルスＨＤに同期して出力される。

【００２１】また、ＣＣＤ出力は上記図１におけるＣＤＳ１４の出力信号、加算器出力は加算器３の出力信号であるが視覚的に理解し易いようにアナログイメージで描れている。更に、ビデオ出力はビデオ出力端子１７の信号波形である。

【００２２】光電変換面が複数の領域に分割されたＣＣＤ１３からの各領域毎の測光情報を、ＣＤＳ１４，Ａ／Ｄ変換器１を介してマイコン６が取り込むと、同マイコン６内の弁別手段６ａでＣＣＤ１３の各領域中の中央部と周辺部の光電出力のレベル差を弁別する。このレベル差が所定値を超えていると上記弁別手段６ａで弁別されれば、マイコン６は被写体が逆光状態と判断して、以下の各動作を順次実行する。

【００２３】第１フィールド３１が時刻ｔ１で開始されると、垂直ブランキング信号ＶＢＬＫ３３のアクティブＬ期間中に、転送タイミング信号ＴＧ３４が送出される。すると同ＴＧ３４に同期して排出タイミング信号ＸＳＵＢ３５ａ，…３５ｎが前記図１におけるＣＣＤ駆動回路１８からＣＣＤ１３に向け送出されるので、このＸＳＵＢ３５ａ，…３５ｎ送出中は、ＣＣＤ１３の光電変換面上に被写体光が照射されても、フォトダイオード上の光電変換された電荷を垂直転送レジスタに排出してしまうので、電荷蓄積は行われない。

【００２４】従って、排出タイミング信号ＸＳＵＢ３５ｎから次の第２フィールドにおける転送タイミング信号ＴＧ４４が送出されるまでの期間が、ＣＣＤ１３のフォトダイオードへの電荷蓄積期間になり、これによって第２の露光制御モードにおけるピーク露光が行われる。つまり、排出タイミング信号ＸＳＵＢの送出期間を調節することによりピーク露光に対応した高速シャッタ動作を行っている。

【００２５】ところで、上記ピーク露光に対応して蓄積された電荷は次の第２フィールドで読み出されるＣＣＤ出力４２で、この第１フィールドで読み出されたＣＣＤ出力３２は、この第１フィールドに先立つ第０フィールドにおける中央重点露光に対応して得られた蓄積電荷を、上記転送タイミング信号ＴＧ３４で読み出したものである。

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【００２６】そして、このＣＣＤ出力３２は、前記図１におけるフィールドメモリ２に格納される。実際には、このＣＣＤ出力３２にこの第１フィールドに先立つ第０フィールド期間中に上記メモリ２に格納されたピーク露光情報２６ａとの加算が行われるが、この加算については、次の第２フィールドで説明することとして、ここでの説明を省略する。

【００２７】第２フィールド４１で、ＣＣＤ１３の光電変換面上のフォトダイオードに蓄積される電荷の蓄積期間中は、転送タイミング信号ＴＧ４４からＴＧ５４までの１／６０秒となり、中央重点露光による低速シャッタ動作が行われる。この蓄積電荷の波形は、次の第３フィールド５１におけるＣＣＤ出力５２である。

【００２８】さて、この第２フィールド４１におけるＣＣＤ出力４２は、上記第１フィールド期間中にＣＣＤ１３のフォトダイオード上に蓄積されたピーク露光に対応した信号を、ＶＢＬＫ４３のアクティブＬ期間中に出力されるＴＧ４４で読出した信号である。このピーク露光によるＣＣＤ出力４２は、前記図１におけるＣＤＳ１４，Ａ／Ｄ変換器１を介して加算器３の一方の入力端に供給される。

【００２９】一方、この加算器３の他方の入力端には、フィールドメモリ２に格納された、上記第１フィールド３１で読み出された中央重点露光によるＣＣＤ出力３２が供給されているので、ＣＣＤ出力３２に４２が加算されて加算器出力４６が得られる。この加算器出力４６は、乗算器４で１／２倍されてビデオ出力４７になる。従って、ビデオ出力４７は、ピーク露光によるＣＣＤ出力４２と中央重点露光によるＣＣＤ出力３２との相加平均に対応した信号になる。

【００３０】上記ＣＣＤ出力４２は、フィールドメモリ２にも印加されて、同メモリ２のメモリ情報の書き換えが行われるが、上記加算演算が終了してから上記メモリ情報の書き換えが行われるように、マイコン６でタイミング制御が行われるようになっている。

【００３１】さて、ＣＣＤ出力はフィールド毎に中央重点露光による信号とピーク露光による信号とが交互に出力されるので、第３フィールド５１以降も上記動作が繰返され、ピーク露光によるＣＣＤ出力と中央重点露光によるＣＣＤ出力との相加平均に対応する信号が得られる。従って、結果として映像信号のダイナミックレンジを拡大したことになる。

【００３２】このようにフィールド毎に、ＣＣＤ１３のフォトダイオード上に蓄積される電荷の蓄積時間をフィールド毎に変えることにより、逆光シーンにおける背景光のような高輝度光に対しては排出タイミング信号ＸＳＵＢの送出時間を調節することにより露光時間を短くして白とびを防止し、逆光シーンにおける主要被写体のような低輝度光に対しては露光時間を１／６０秒と長く設定して黒つぶれを防止するようにしている。

6

【００３３】なお、上記実施例では、中央重点露光時の露光時間を１／６０秒として説明したが、絞りやシャッタ速つまり電荷蓄積時間をコントロールすることにより自由に設定できる。また、逆光シーンを前提に説明したが、これに限定されることなく、輝度差の激しい被写体の撮影に広く適用できる。更に、静止画撮影時ばかりでなく動画撮影にも適用できる。

【００３４】上記実施例によれば、ダイナミックレンジの狭いＣＣＤ等の撮像手段を広ダイナミックレンジ化できるので、例えば逆光シーンでの撮影のように被写体の輝度差が大きいシーンの撮影が可能になる。

【００３５】

【発明の効果】以上述べたように本発明によれば、単位画像に対応する撮像手段の光電変換面内で、その部分間での光電変換出力のレベル差が所定値を超えているか否かを弁別手段で弁別し、該レベル差が所定値を超えていると弁別したときには、上記光電変換面全面乃至その特定部分からの光電変換出力に基づいて上記露光量の制御を行う第１の露光制御モードと、上記単位画像に対応する撮像手段の光電変換面からの光電変換出力のうちの実質的なピーク値に基づいて上記露光量の制御を行う第２の露光制御モードとの２つの露光制御モードを交互に実行し、該第１の露光制御モードによる光電変換出力に対応する信号と第２の露光制御モードによる光電変換出力に対応する信号との相加平均に対応する信号を得て露光量を制御するようにしたので、被写体の輝度差が大きいシーンの撮影においても、白とびや黒つぶれを生じることがないという顕著な効果が発揮される。

【図面の簡単な説明】

【図１】本発明の一実施例を示す電子的撮像装置のブロック構成図。

【図２】上記図１における各部信号のタイミングチャート。

【図３】従来の電子的撮像装置のブロック構成図。

【図４】上記図３における撮影対象を示す図。

【符号の説明】

２…フィールドメモリ（相加平均に対応する信号を得る手段）

３…加算器（相加平均に対応する信号を得る手段）

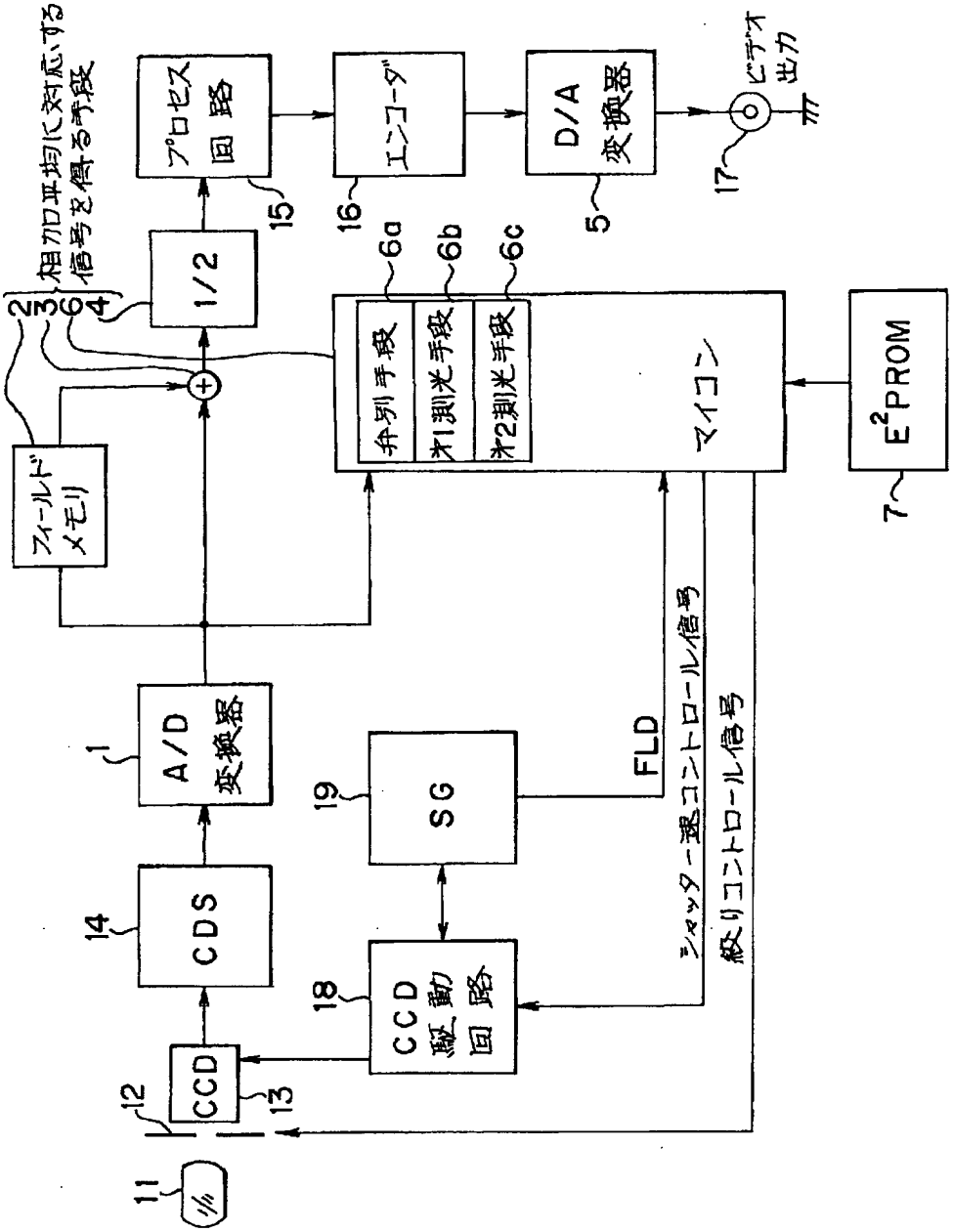
４…乗算器（相加平均に対応する信号を得る手段）

６…マイコン（相加平均に対応する信号を得る手段）

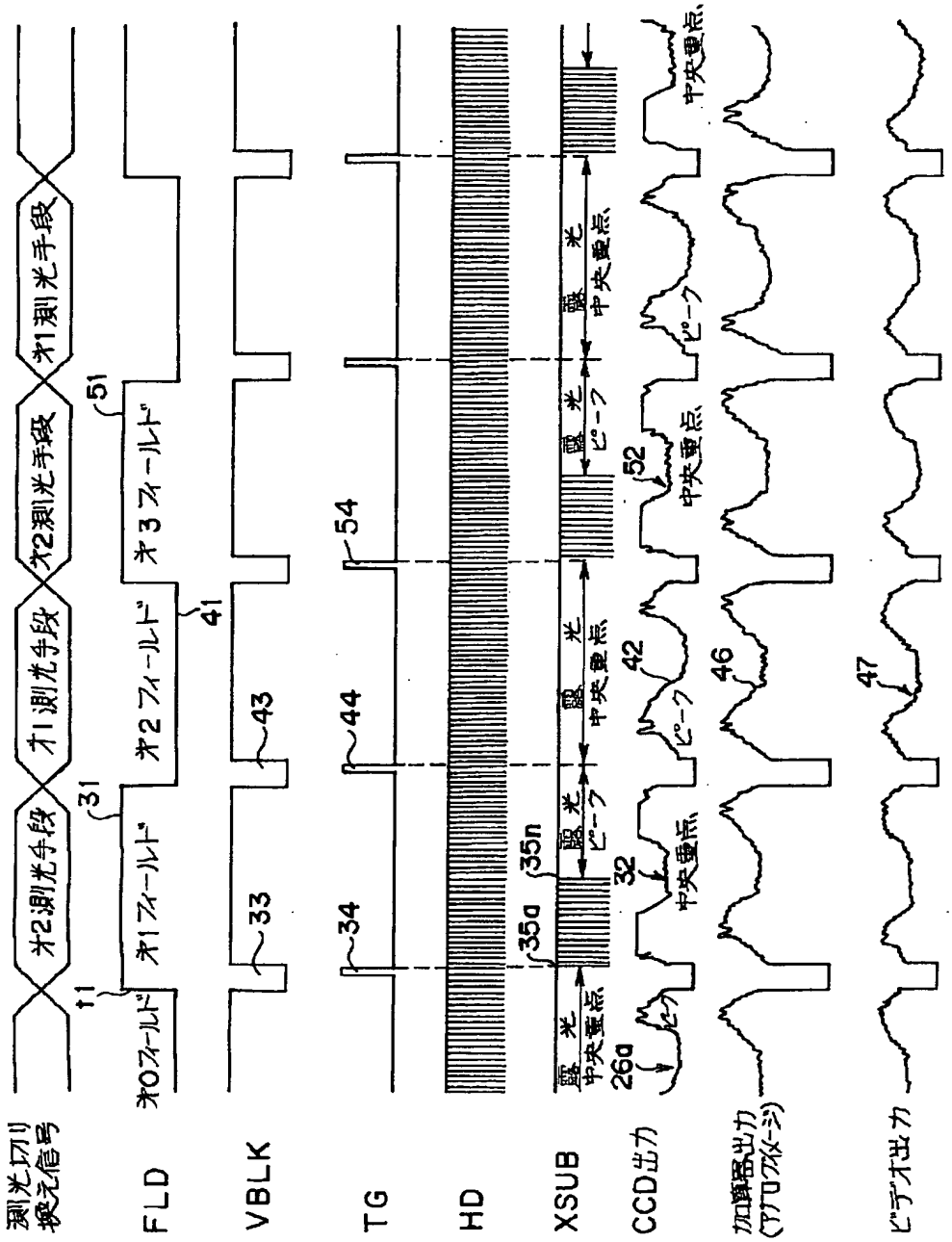
６ａ…弁別手段

１３…ＣＣＤ（撮像手段）

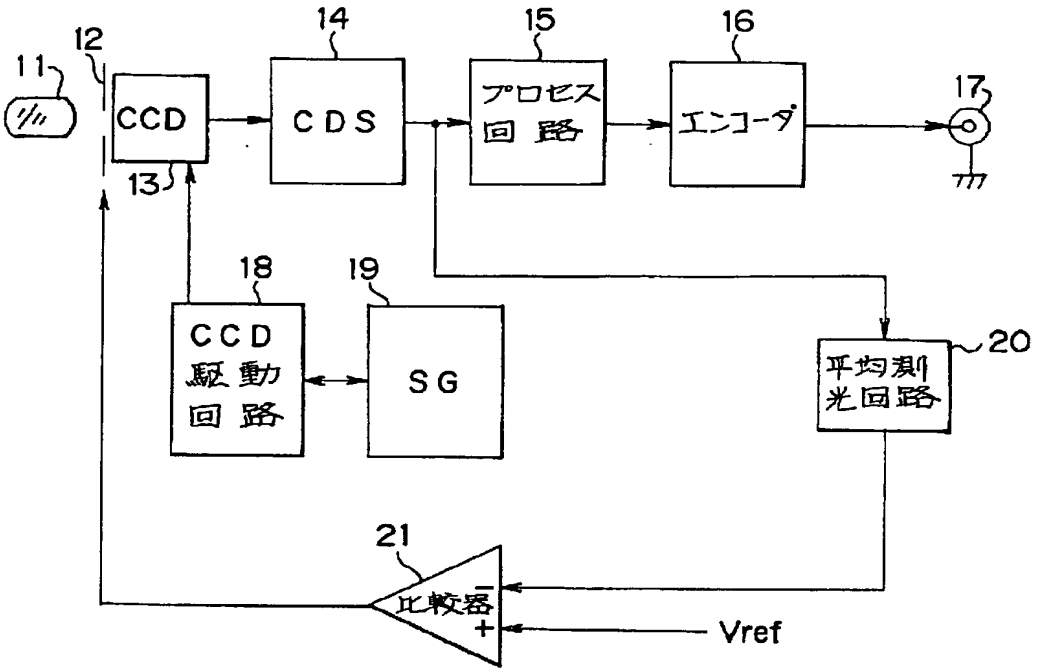
【図１】


相加平均に対応する信号を得る手段
2
3
6
4
1/2
プロセス回路
15
エンコーダ
16
D/A変換器
5
ビデオ出力
17
6a
6b
6c
弁別手段
第1測光手段
第2測光手段
マイコン
E²PROM
7
フィールドメモリ
A/D変換器
1
CDS
14
CCD
12
13
11
SG
19
CCD駆動回路
18
FLD
シャッター速コントロール信号
絞りコントロール信号

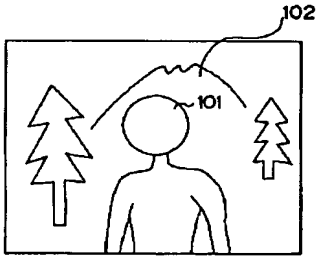
【図2】


測光切り換え信号
FLD
VBLK
TG
HD
XSUB
CCD出力
加算器出力
ビデオ出力
第2測光手段
第1測光手段
第2測光手段
第1測光手段
第0フィールド
第1フィールド
第2フィールド
第3フィールド
31
51
41
33
34
43
44
54
35n
35a
32
42
52
46
47
26a
露光
中央重点
ピーク

【図３】


11
12
CCD
13
14
CDS
15
プロセス回路
16
エンコーダ
17
18
CCD駆動回路
19
SG
20
平均測光回路
21
比較器
−
+
Vref

【図４】


102
101

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-056343
(43)Date of publication of application : 05.03.1993

(51)Int.Cl. H04N 5/243
// G03B 7/28

(21)Application number : 03-211040
(22)Date of filing : 22.08.1991

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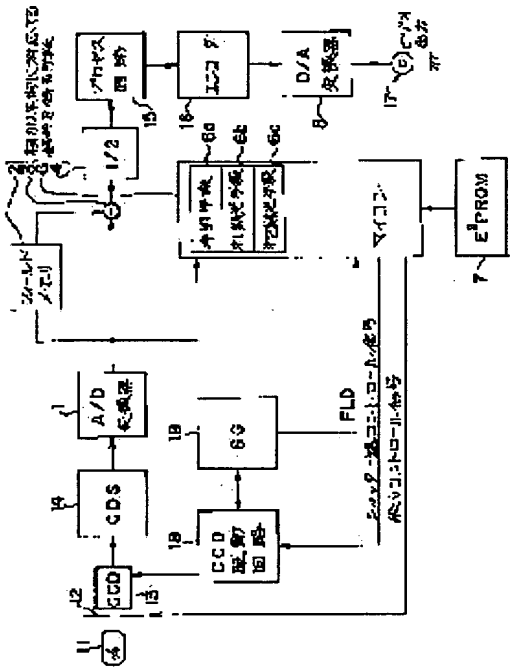
(72)Inventor : HIRATA KEIJI

(54) ELECTRONIC IMAGE PICKUP DEVICE

(57)Abstract:
PURPOSE: To prevent the generation of a white skip or a black flat by respectively inputting an objective luminance signal of each area from a CCD which is divided into plural areas to a microcomputer, and discriminating a luminance difference at each area by a discriminating means.
CONSTITUTION: When photometric information of each area from a CCD 13 whose photoelectric conversion face is divided into plural areas is fetched through a CDS 14 and an A/D converter 1 by a microcomputer 6, the level difference of the photoelectric output of the central part and surrounding part of each area of the CCD 13 is discriminated by a discriminating means 6a in the microcomputer 6. Then, when the level difference is discriminated to be beyond a prescribed value by the discriminating means 6a, the microcomputer 6 judges that an object is in a counter light state, repeatedly executes a selective central photometry and a peak photometry at each field, and searches a signal corresponding to the additive average of each photometric value. Thus, the storage time of a charge which is stored on the photodiode of the CCD 13 is changed at each field, so that an exposing time can be shortened for a high luminance signal.



LEGAL STATUS

[Date of request for examination] 21.08.1998
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number] 3273619
[Date of registration] 01.02.2002
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] Are the electronic image pickup device which controls the light exposure applied to the image pick-up means concerned according to the quantity of light, and in the photo-electric-conversion side of the above-mentioned image pick-up means corresponding to a unit image A discrimination means to discriminate from whether the level difference of the photo-electric-conversion output between the part is over the predetermined value, When the above-mentioned discrimination means discriminates from the level difference of the photo-electric-conversion output between the part being over a predetermined value in the photo-electric-conversion side of the above-mentioned image pick-up means The 1st exposure control mode which controls the above-mentioned light exposure based on the photo-electric-conversion output from the above-mentioned whole photo-electric-conversion side surface thru/or its particular part, The two exposure control modes with the 2nd exposure control mode which controls the above-mentioned light exposure based on the substantial peak value of the photo-electric-conversion outputs from the photo-electric-conversion side of the image pick-up means corresponding to the above-mentioned unit image are performed by turns. this -- the electronic image pickup device characterized by providing a means to acquire the signal corresponding to the arithmetical mean of the signal corresponding to the photo-electric-conversion output by the 1st exposure control mode, and the signal corresponding to the photo-electric-conversion output by the 2nd exposure control mode.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention -- an electronic image pickup device -- in detail, a dynamic range is large and is appropriately related with the electronic image pickup device which can be picturized in a backlight scene etc.
[0002]
[Description of the Prior Art] The outline of the block configuration of the conventional electronic image pickup device The diaphragm device 12 in which the quantity of light of the photographic subject light which penetrated the taking lens 11 and this lens 11 is adjusted as shown in drawing 3 , CCD13 as an image pick-up means to carry out photo electric conversion of the photographic subject light, and to output a video signal, CDS14 which carries out the correlation duplex sampling of this video signal, and the process circuit 15 which separates and carries out signal processing of the output of this CDS14 to a luminance signal Y and a chrominance signal C, These signals For example, the encoder 16 changed into an NTSC **** video signal, The video outlet terminal 17 which sends out a video signal towards the external instrument which is not illustrated, The average photometry circuit 20 which integrates with the output of the above CDS 14 and outputs average photometry information, It is reference voltage Vref about the above-mentioned average photometry information. The comparator 21 which compares and controls a diaphragm of the above-mentioned diaphragm device 12, It consists of a CCD drive circuit 18 which controls the substrate electrical-potential-difference impression for unnecessary charge discharge in the perpendicular transfer pulse of the above CCD 13, and a level transfer pulse list, and SG19 which generates the timing signal in accordance with television specification.
[0003] Thus, for the exposure control in the constituted conventional electronic image pickup device, the average photometry information outputted from the above-mentioned average photometry circuit 20 is the reference voltage Vref impressed to the noninverting input edge of a comparator 21. It extracts becoming equal, and he controls a diaphragm of a device 12, and is trying to take a photograph with predetermined light exposure by this.
[0004]
[Problem(s) to be Solved by the Invention] However, in the above-mentioned conventional electronic image pickup device which carries out exposure control so that average photometry information may be set to the reference level set up beforehand, since the dynamic range of image pick-up means, such as CCD, is narrow, when the brightness difference of a photographic subject like a backlight scene is large, a problem arises, for example.
[0005] That is, when photoing the person 101 as shows drawing 4 under a backlight, the background 102 of a tree, a crest, etc. has high brightness to the person 101 who is a main photographic subject being low brightness. Then, if exposure is doubled with the person 101 who is a main photographic subject, for the excess of exposure, the background 102 which is the high brightness section will cause the so-called white jump which the gradation will be lost and becomes whitish uniformly, and will become an unsightly image. Conversely, if exposure is doubled with the background 102 which is the high brightness section, since exposure of the important person 101 who is a main photographic subject to actually photo is insufficient, the

so-called black crushing which the gradation is lost and becomes blackish uniformly will be caused.

[0006] Then, the purpose of this invention cancels the above-mentioned trouble, and is to offer the electronic image pickup device with which the brightness difference of a photographic subject produces neither a white jump nor black crushing also in photography of a large scene.

[0007]

[Means for Solving the Problem and its Function] The electronic image pickup device of this invention is an electronic image pickup device which controls the light exposure applied to the image pick-up means concerned according to the quantity of light, and in the photo-electric-conversion side of the above-mentioned image pick-up means corresponding to a unit image A discrimination means to discriminate from whether the level difference of the photo-electric-conversion output between the part is over the predetermined value, When the above-mentioned discrimination means discriminates from the level difference of the photo-electric-conversion output between the part being over a predetermined value in the photo-electric-conversion side of the above-mentioned image pick-up means The 1st exposure control mode which controls the above-mentioned light exposure based on the photo-electric-conversion output from the above-mentioned whole photo-electric-conversion side surface thru/or its particular part, The two exposure control modes with the 2nd exposure control mode which controls the above-mentioned light exposure based on the substantial peak value of the photo-electric-conversion outputs from the photo-electric-conversion side of the image pick-up means corresponding to the above-mentioned unit image are performed by turns. this -- it is characterized by providing a means to acquire the signal corresponding to the arithmetical mean of the signal corresponding to the photo-electric-conversion output by the 1st exposure control mode, and the signal corresponding to the photo-electric-conversion output by the 2nd exposure control mode.

[0008]

[Example] Hereafter, with reference to a drawing, this invention is explained concretely. Drawing 1 is the block block diagram of the electronic image pickup device in which one example of this invention is shown, it gives the same sign to the same configuration member as drawing 3 in said conventional example, omits the explanation, attaches signs 1-7 only about a different member, and explains them below.

[0009] The A/D converter from which a sign 1 changes the output of CDS14 into digital value, The field memory to which 2 carries out memory of the image information for the 1 field, the adder with which 3 adds the output of above-mentioned A/D converter 1, and the output of the above-mentioned field memory 2, The multiplier with which 4 multiplies the output of the above-mentioned adder 3 by multipliers 1/2, the D/A converter with which 5 was outputted from the encoder 16 and which changes the digital signal of NTSC system into an analog signal, for example, and 6 are microcomputers. Shutter ** and a diaphragm are controlled by built-in discrimination means 6a, 1st photometry means 6b, 2nd photometry means 6c, etc. Moreover, 7 writes in the saturation level of CCD13 etc. by E2PROM, and supplies the signal to the above-mentioned microcomputer 6.

[0010] In the photo-electric-conversion side of CCD13 as an image pick-up means corresponding to a unit image, like photography on the backlight scene which discriminates from whether the level difference of the photo-electric-conversion output between the part is over the predetermined value, and showed it to said drawing 4 , discrimination means 6a built in the above-mentioned microcomputer 6 discriminates from this, when the brightness difference of a photographic subject is acute.

[0011] Moreover, 1st photometry means 6b built in the above-mentioned microcomputer 6 With the photometry means used at the time of the 1st exposure control mode which controls light exposure based on the photo-electric-conversion output from the particular part of front-face ****** of a photo-electric-conversion side of the above CCD 13 Divide a screen into some fields, and greatly and conversely, by the periphery, since weighting was made small, weighting of a center section The photometry which also considered the periphery with

emphasis on the main photographic subjects 101 arranged in the center in the backlight scene shown in said drawing 4 can be performed, and central important exposure is called below. Furthermore, since 2nd photometry means 6c supports the peak level of a signal with the photometry means used at the time of the 2nd exposure control mode which controls light exposure based on the substantial peak value of the photo-electric-conversion outputs from the photo-electric-conversion side of CCD13 as an image pick-up means corresponding to a unit image, it can be used for the photography which doubled exposure with the background of high brightness in the backlight scene shown in said drawing 4 , and calls peak exposure below.

[0012] In addition, the photo-electric-conversion side is divided into two or more fields, and CCD13 as an image pick-up means in this example can take out now the photometry information for every field to each **. Moreover, if the high voltage is impressed to this CCD substrate, the unnecessary stored charge on the photo-electric-conversion side shall be discharged to a lengthwise direction.

[0013] When point ****** of the base of actuation of constituted this example is carried out, the exposure control mode of the above 1st, and the 2nd exposure control mode for every field thus, by turns For example, in the odd number field, perform the exposure control mode of the above 1st, and the exposure control mode of the above 2nd is performed for example, in the even number field, respectively. this -- the signal corresponding to the arithmetical mean of the signal corresponding to the photo-electric-conversion output by the 1st exposure control mode and the signal corresponding to the photo-electric-conversion output by the 2nd exposure control mode is searched for. And the above-mentioned field memory 2, an adder 3, and multiplier 4 list are asked for the signal corresponding to such the arithmetical mean with a microcomputer 6, and it is explained to a detail, carrying out the object for the averages of the timing chart of drawing 2 below.

[0014] It is as follows when each signal in point ****2 is explained.

[0015] Photometry switch signal -- Signal which switches 1st photometry means 6b in the above-mentioned microcomputer 6, and 2nd photometry means 6c.

[0016] FLD -- Field switch signal.

[0017] VBLK -- Perpendicular blanking signal.

[0018] The timing signal (a charge is transmitted by driving a perpendicular transfer pulse high-level to this timing in fact) which transmits the charge accumulated in the photodiode of TG--CCD to a perpendicular transfer register.

[0019] HD -- Level drive pulse.

[0020] The high voltage is impressed to the substrate of a XSUB--CCD imager, and it is outputted to a lengthwise direction by the signal which shows the timing which discharges a charge synchronizing with the level drive pulse HD.

[0021] Moreover, a CCD output is an analog image so that it may be easy to understand visually, although the output signal of CDS14 in above-mentioned drawing 1 and an adder output are the output signals of an adder 3, and it is **********. Furthermore, a video outlet is the signal wave form of the video outlet terminal 17.

[0022] If a microcomputer 6 incorporates the photometry information for every field from CCD13 that the photo-electric-conversion side was divided into two or more fields, through CDS14 and A/D converter 1, it discriminates from the level difference of the photoelectrical output of a center section and the periphery in each field of CCD13 by discrimination means 6a in this microcomputer 6. If it is discriminated by the above-mentioned discrimination means 6a when this level difference is over the predetermined value, a photographic subject will judge a microcomputer 6 to be a backlight condition, and sequential execution of each following actuation will be carried out.

[0023] The 1st field 31 is time of day t1. Initiation sends out the transfer-timing signal TG 34 throughout [active L term]. [of the perpendicular blanking signal VBLK33] Then, since the charge with which photo electric conversion of [on a photodiode] was carried out even if photographic subject light was irradiated on the photo-electric-conversion side of CCD13 during this XSUB35a and --35n sending out since discharge timing signal XSUB35a and --35n

were sent out towards CCD13 synchronizing with this TG34 from the CCD drive circuit 18 in said drawing 1 is discharged to a perpendicular transfer register, a charge storage is not performed.

[0024] Therefore, a period until the transfer-timing signal TG 44 in the 2nd next field is sent out from discharge timing signal XSUB35n turns into a charge storage period to the photodiode of CCD13, and peak exposure in the 2nd exposure control mode is performed by this. That is, high-speed shutter actuation corresponding to peak exposure is performed by adjusting the sending-out period of discharge timing signal XSUB.

[0025] By the way, the CCD output 32 which the charge accumulated corresponding to the above-mentioned peak exposure is the CCD output 42 read in the 2nd next field, and was read in this 1st field reads the stored charge obtained corresponding to the central important exposure in the 0th field before this 1st field by the above-mentioned transfer-timing signal TG 34.

[0026] And this CCD output 32 is stored in the field memory 2 in said drawing 1 . Although addition with peak exposure information 26a stored in the above-mentioned memory 2 during the 0th field period before this 1st field is carried out to this CCD output 32 in fact, about this addition, explanation here is omitted as explaining in the 2nd next field.

[0027] It has been 1 / 60 seconds from the transfer-timing signal TG 44 to TG54 during the are recording period of the charge accumulated in the photodiode on the photo-electric-conversion side of CCD13, and low-speed shutter actuation by central important exposure is performed in the 2nd field 41. The wave of this stored charge is the CCD output 52 in the 3rd next field 51.

[0028] Now, the CCD output 42 in this 2nd field 41 is the signal which read the signal corresponding to the peak exposure accumulated on the photodiode of CCD13 during the above-mentioned 1st field period by TG44 outputted to throughout [active L term]. [of VBLK43] The CCD output 42 by this peak exposure is supplied to one input edge of an adder 3 through CDS14 in said drawing 1 , and A/D converter 1.

[0029] On the other hand, since the CCD output 32 by the central important exposure read in the 1st field 31 of the above stored in the field memory 2 is supplied to the input edge of another side of this adder 3, 42 is added to the CCD output 32 and the adder output 46 is obtained. This adder output 46 is doubled 1/2 with a multiplier 4, and turns into a video outlet 47. Therefore, a video outlet 47 becomes a signal corresponding to the arithmetical mean of the CCD output 42 by peak exposure, and the CCD output 32 by central important exposure.

[0030] Although the above-mentioned CCD output 42 is impressed also to a field memory 2 and rewriting of the memory information on this memory 2 is performed, after the above-mentioned add operation is completed, timing control is performed by the microcomputer 6 so that rewriting of the above-mentioned memory information may be performed.

[0031] Now, since the signal according [a CCD output] to central important exposure the whole field and the signal by peak exposure are outputted by turns, the above-mentioned actuation is repeated for the 3rd field 51 or subsequent ones, and the signal corresponding to the arithmetical mean of the CCD output by peak exposure and the CCD output by central important exposure is acquired. Therefore, it means expanding the dynamic range of a video signal as a result.

[0032] Thus, by changing the storage time of the charge accumulated on the photodiode of CCD13 for every field for every field By adjusting the sending-out time amount of discharge timing signal XSUB to high brightness light like the background light in a backlight scene, shorten the exposure time and a white jump is prevented. To low brightness light like the main photographic subjects in a backlight scene, he sets up the exposure time for a long time with 1 / 60 seconds, and is trying to prevent black crushing.

[0033] In addition, in the above-mentioned example, although the exposure time at the time of central important exposure was explained as 1 / 60 seconds, it can set up freely by controlling a diaphragm and shutter **, i.e., the charge storage time. Moreover, although it explained on the assumption that a backlight scene, it can apply to photography of the intense photographic subject of a brightness difference widely, without being limited to this.

Furthermore, it is applicable not only to the time of still picture photography but animation photography.

[0034] According to the above-mentioned example, since-izing of the image pick-up means, such as narrow CCD of a dynamic range, can be carried out [an extensive dynamic range], photography of a scene with the large brightness difference of a photographic subject is attained, for example like photography on a backlight scene.

[0035]

[Effect of the Invention] As stated above, according to this invention, in the photo-electric-conversion side of the image pick-up means corresponding to a unit image When it discriminated with the discrimination means from whether the level difference of the photo-electric-conversion output between the part is over the predetermined value, and this level difference was over the predetermined value and being discriminated The 1st exposure control mode which controls the above-mentioned light exposure based on the photo-electric-conversion output from the above-mentioned whole photo-electric-conversion side surface thru/or its particular part, The two exposure control modes with the 2nd exposure control mode which controls the above-mentioned light exposure based on the substantial peak value of the photo-electric-conversion outputs from the photo-electric-conversion side of the image pick-up means corresponding to the above-mentioned unit image are performed by turns. this, since the signal corresponding to the arithmetical mean of the signal corresponding to the photo-electric-conversion output by the 1st exposure control mode and the signal corresponding to the photo-electric-conversion output by the 2nd exposure control mode is acquired and light exposure was controlled The remarkable effectiveness that the brightness difference of a photographic subject produces neither a white jump nor black crushing also in photography of a large scene is demonstrated.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block block diagram of the electronic image pickup device in which one example of this invention is shown.
[Drawing 2] The timing chart of each part signal in above-mentioned drawing 1 .
[Drawing 3] The block block diagram of the conventional electronic image pickup device.
[Drawing 4] Drawing showing the candidate for photography in above-mentioned drawing 3 .
[Description of Notations]
2 -- Field memory (a means to acquire the signal corresponding to the arithmetical mean)
3 -- Adder (a means to acquire the signal corresponding to the arithmetical mean)
4 -- Multiplier (a means to acquire the signal corresponding to the arithmetical mean)
6 -- Microcomputer (a means to acquire the signal corresponding to the arithmetical mean)
6a -- Discrimination means
13 -- CCD (image pick-up means)

[Translation done.]